THE COMMONWEALTH OF MASSACHUSETTS

WATER RESOURCES COMMISSION

100 CAMBRIDGE STREET, BOSTON MA 02114

Policy for Developing Water Needs Forecasts for Public Water Suppliers and Communities and Methodology for Implementation

December 13, 2007

I. POLICY STATEMENT

It is the policy of the Commonwealth of Massachusetts that the Water Resources Commission (WRC) shall develop water needs forecasts for public water suppliers and communities seeking increased water withdrawals under the Water Management Act (WMA) and for other purposes as deemed appropriate by the Commission. As a result of the development of the water needs forecast, the WRC may make recommendations to the public water suppliers or communities regarding water use, system efficiency or other issues. Where such water needs forecasts may be pursued for actual withdrawal use by a public water supplier or community, at a minimum, permitting by the Massachusetts Department of Environmental Protection (MassDEP) is required.

II. BACKGROUND AND REQUIREMENTS FOR DEVELOPING A WATER NEEDS FORECAST FOR PUBLIC WATER SUPPLY SYSTEMS

A. Introduction and History

This policy is consistent with the requirements of the WMA (M.G.L. Chapter 21G), which states that the Department of Environment Protection and the Water Resources Commission:

> shall cooperate in the planning, establishment and management of programs to assess the uses of water in the commonwealth and to plan for future water needs.
>
> The commission shall adopt principles, policies and guidelines necessary for the effective planning and management of water use and conservation in the commonwealth and for the administration of this chapter as necessary and proper to ensure an adequate volume and quality of water for all citizens of the commonwealth, both present and future. Such principles, policies and guidelines shall be designed to protect the natural environment of the water in the commonwealth; to assure comprehensive and systematic planning and management of water withdrawals and use in the commonwealth, recognizing that water is both finite and renewable; and to allow continued and sustainable economic growth throughout the commonwealth and increase the social and economic well being and safety of the commonwealth's citizens and of its work force.

These responsibilities coincide with the WRC's responsibilities under M.G.L. chapter 21A, which include:

> (a) development of a water resources management policy framework within which the water resource policies, plans and management programs of the several agencies and

> departments under the secretary shall function; (b) coordination of water resources planning and management functions among the several agencies and departments under the secretary.

In 1991, the Water Resources Commission approved a methodology to forecast the estimated volume of water needed by the population served by a public water supply system at a specific date in the future. That methodology was, in turn, a revision of one that was developed in the mid-1980s. The methodology was approved in 1991 and the Policy for Developing Water Needs Forecasts was approved in 2001. Since that time, the Commonwealth has updated its Water Conservation Standards (EOEA and WRC 2006), an action recommended in the 2004 Massachusetts Water Policy (EOEA 2004). Water conservation and management requirements are also addressed through WRC review and approval of interbasin transfers in accordance with the Interbasin Transfer Act and its performance standards (http://www.mass.gov/dcr/waterSupply/intbasin/docs/finalps.doc). In addition, there has been a general trend toward increasing system efficiency and improved water system management by public water supply systems. This revision of the water needs forecasting policy and methodology reflects these more recent trends.

B. Purpose and Approach

Public water suppliers and communities seeking to increase water withdrawal volumes from existing water supply sources or to obtain approval for new withdrawals under the WMA must institute reasonable conservation practices and measures consistent with efficient utilization of water throughout all components of their water supply system. They also are strongly advised to satisfy current and future water needs by investigating all feasible sources of supply and conservation as outlined in the Massachusetts Water Policy (EOEA 2004) and the Water Conservation Standards (EOEA and WRC 2006). This document provides guidance on how to obtain a water needs forecast and explains the methodology used by the Water Resources Commission to develop water needs forecasts. The methodology is based on historic and existing water-use patterns, population projections, and employment projections, and it incorporates water-use efficiency and conservation standards.

A water needs forecast is the estimated volume of water a public water supplier will need to provide to meet community needs at a given time in the future. It does not address water source availability or impacts that additional water withdrawals may have on water resource sustainability, environmental resources, or competing users. A water needs forecast is not intended as a water-use entitlement; it does not comment on which source a community should use in order to meet future needs; nor does it comment on how much of a source can be used or if a redundant source should be permitted. In addition, forecasts may be conditioned by MassDEP based on an analysis of physical and environmental constraints and impacts of specific water supplies.

Step One: Consultation. A public water supplier or community that is planning to renew a WMA permit, or is experiencing an increase in water withdrawals and is approaching its registered or permitted withdrawal volume and expects future increases to continue, should contact WRC staff at the Department of Conservation and Recreation, Office of Water Resources. In addition, public water suppliers or communities with existing Water Management Act permits will need new water needs forecasts to renew permitted withdrawal volumes. Staff

will guide water suppliers, communities, and their consultants in the preparation of a request for a water needs forecast. This will involve compilation by the water supplier of existing water-use data. WRC staff will review the existing data and system operations to determine the current status of water use, water-use efficiency and community growth indicators affecting water use. Based on this review, WRC staff may conclude either (a) that the community has a need for additional water and has adequate data to enable WRC staff to prepare a forecast or (b) that there is inadequate information to determine the need for additional water. In the latter case, staff may make recommendations for the collection of additional information and/or will recommend an interim allocation of water, as described in section E, below.

Step Two: Developing a Forecast. Working with the water supplier and/or community, WRC staff will develop a draft water needs forecast. The Water Resources Commission has delegated to staff the responsibility to use the approved methodology and develop and finalize the forecasts, waiving its formal review and approval process for each individual forecast. This forecast will be reviewed by the water supplier and community. Once the forecast is finalized, the water supplier or community may use these volumes in its application to MassDEP for a Water Management Act water withdrawal permit or for other planning purposes. The WRC will consider requests to review an individual forecast by a Commission member, by a representative of the affected community, or by WRC staff. WRC staff will regularly inform the WRC of forecasts prepared.

C. Incorporation of the Most Recent Water Conservation Standards

The water needs forecasting methodology incorporates the Water Conservation Standards for the Commonwealth of Massachusetts (EOEA and WRC 2006 or latest version) and assumes that water suppliers will develop plans and programs to comply with these standards.

The standard for unaccounted-for water, Standard 2.3 of the Water Conservation Standards, is to "meet or demonstrate steady progress toward meeting 10% unaccounted-for water as soon as practicable, especially in those communities in a basin with a higher level of stress." The standard for residential water use, Standard 5.2 of the Water Conservation Standards, is to "meet or demonstrate steady progress toward meeting residential water use of 65 gallons per capita per day (gpcd) including both indoor and outdoor use as soon as practicable, especially in those communities in a basin with a higher level of stress." The WRC also expects that water suppliers and communities will implement the Water Conservation Standards in other categories of use and will work with industrial, commercial, institutional, and other sectors to reduce inefficient and/or unnecessary water consumption.

The Water Conservation Standards allow for flexibility, stating "The Commonwealth recognizes the existence of circumstances that could affect a community's efforts to fully meet these standards. These circumstances could include aging infrastructure and large seasonal population fluctuations. In such cases, the community should document, as part of its regulatory requirements, all efforts that have been undertaken to comply…." (EOEA and WRC 2006). Water suppliers and communities are encouraged to discuss their specific circumstances with WRC staff as soon as possible in the process outlined in Section B above.

D. Minimum Requirements for Preparation of a Water Needs Forecast

All public water suppliers or communities seeking new water needs forecasts must meet minimum conditions, described in the four points below; these conditions are intended to provide WRC staff with accurate and sufficient data needed for assessing water use. It is not possible to reliably develop forecasts using the WRC-approved methodology unless these data are provided. For certain communities with significant seasonal population fluctuations, such as on Cape Cod and the Islands, determining accurate populations served can be very difficult; however, careful estimates based on experience and efficient record keeping should yield reasonably accurate figures for the purposes of forecasting domestic water use. Water suppliers also should recognize that there can be a considerable lead time in obtaining the needed information, and should plan accordingly.

1. The public water supplier must provide the following information from its Annual Statistical Reports provided to MassDEP or from other sources, for at least the last three, or preferably five, years:
   (a) Water-use information based on actual metering;
   (b) A breakdown of water use into residential, non-residential, unaccounted-for, and treatment plant loss categories;
   (c) Service population, both year-round and seasonal;
   (d) Other related information as determined by WRC staff after initial consultations.
2. Based on the information in #1, and additional information that may be available, the following conditions must be demonstrated in order for WRC staff to prepare a forecast. (If these conditions cannot be met, refer to Part E - Interim Allocations of Water):
   (a) Unaccounted-for water should not exceed an average of 15% of the total system water used during the most recent three-year period. In cases where the three-year average exceeds 15%, water suppliers and/or communities should consult with WRC staff to assess the feasibility of developing a forecast with current data.
   (b) All systems that have unaccounted-for water exceeding 10% must have a program in place to reduce unaccounted-for water to 10% or less as soon as practicable, or as required in the water supplier's WMA permit.
   (c) Residential water use should not exceed an average of 80 gallons per capita per day (gpcd) in the most recent three-year period. In cases where the three-year average exceeds 80 gpcd, water suppliers and/or communities should consult with WRC staff to assess the reliability of the data and the feasibility of developing a forecast with current data. Correspondingly, if the three-year average per capita demand is unusually low, WRC staff will assess the reliability of the data provided and the feasibility of using it to develop a forecast.
   (d) All systems that have residential water use exceeding 65 gpcd, must have a program in place to reduce residential water use to 65 gpcd or less as soon as practicable, or as required in the WMA permit.

3. The water supplier must have completed a Water Conservation questionnaire (WRC 2007 in draft) within the last year to provide an overview of system operations and water conservation programs.

4. A community or public water supply system with an existing WMA permit must demonstrate that the conservation conditions of its permit have been met. MassDEP will confirm that the

conditions have been met or substantially complied with, or an approved plan is in place to meet the conditions in a reasonable and specified time.

E. Interim Allocations of Water

Public water suppliers that cannot provide information required to develop a water needs forecast as described above, or cannot meet the conditions noted in section D, should consult with WRC staff. In these cases, MassDEP may issue a permit with an interim allocation of water. This interim allocation volume is based on the most recent three to five years of water use by the public water supplier and is developed by WRC staff in consultation with MassDEP. The interim allocation can be permitted under the WMA permitting program and may be subject to all the conditions and requirements of that program. Factors considered in determining the interim allocation volume include, but are not limited to, number of new users, non-residential development, changes in system operations, infrastructure condition, and new metering information. This interim allocation is intended to provide a stop-gap volume to water suppliers that can demonstrate a pressing need for water above an existing permitted or registered volume, but cannot meet the data requirements described in section D, above. For these water suppliers, the interim allocation, and the Water Management Act permit that may include these volumes, is intended to be temporary, until sufficient and adequate data can be developed to clearly document current use and future needs.

MassDEP requires those permitted with interim allocations to collect and submit the data needed to calculate current water use and future needs within four years of the permit issuance date. It is expected that communities receiving an interim allocation will develop and implement a plan to comply with the requirements noted in section D above, and the requirements and conditions in their WMA permit. MassDEP may also require the water supplier to provide interim reports containing the required information before the five-year permit review under the Water Management Act. Upon submittal of that additional information, WRC staff will determine whether or not the information is sufficient and accurate enough to develop a water needs forecast for the remaining years of the permit period or if other steps are required, including compliance with administrative consent orders or other actions required by MassDEP.

Once the data are determined to be sufficient, WRC staff will prepare a water needs forecast. Should the forecast indicate that future water needs are less than the volumes used in the interim allocation, MassDEP will allocate volumes through a permit modification consistent with those developed in the forecast.

III. GENERAL WATER NEEDS FORECASTING METHODOLOGY FOR PUBLIC WATER SUPPLY SYSTEMS

This methodology presents the topics and calculations needed to complete the development of a forecast. The methodology uses the most recent three to five years of water use (called Base Demand) for each public water supplier. Water-use data are disaggregated into four categories: residential, non-residential (including commercial, industrial, agricultural, and municipal), municipal water treatment plant losses, and unaccounted-for water (UAW). The main components of this disaggregated approach and the calculations used to arrive at the forecast are detailed below.

Forecasts usually are for the 20-year period coinciding with the WMA permit period. A general expectation in the policy is that water conservation and efficiency will increase for existing and future residents, commercial and industrial enterprises, municipal facilities, and water supply systems. The implementation of this methodology will vary among public water suppliers and communities, depending on individual circumstances, data availability, and other factors.

Definitions

Average Day Demand (ADD) is the total water consumption by all users in the service area, averaged over the calendar year and measured in millions of gallons per day (mgd). In this methodology, ADD includes all raw water pumped and water purchased.

Base Demand is the average of the most recent three- to five-years' average day demand.

Base Service Population is the number of people served by the public water supply system in the most recent year.

Gallons per Capita per Day (gpcd) is the average of daily residential water use measured in gallons used per person in the service area.

Non-residential Water Use includes industrial, commercial, institutional, and municipal water uses within the service area.

Treatment Plant Processing Loss is water consumed in the operations of the municipal water treatment plant. It is determined by subtracting metered amounts of finished water from metered amounts of raw water.

Seasonal Population is the number of people served by the public water supply system who do not live year-round in the service area but who reside in the service area during certain months of the year.

Unaccounted-for water (UAW) is the residual resulting from the total amount of water supplied to a distribution system as measured by master meters, minus the sum of all amounts of water measured by consumption meters in the distribution system, and minus confidently estimated and documented amounts used for certain necessary purposes as specified by MassDEP.

Abbreviations

ADD	average day demand
ASR	Annual Statistical Report
EOEA	Executive Office of Environmental Affairs (now EOEEA)
EOEEA	Executive Office of Energy and Environmental Affairs (formerly EOEA)
gpcd	gallons per capita per day
MassDEP	Massachusetts Department of Environmental Protection
mgd	million gallons per day
PWS	public water supplier
UAW	unaccounted-for water
WMA	Water Management Act (MGL Ch. 21G)
WRC	Water Resources Commission

The attached spreadsheet shows the columns referred to in the following description of the methodology.

Column A identifies the water supplier or community for which the projection is being done.

Columns B through F show the current population and base service population. Data are obtained from the water supplier, town planner or clerk, regional planning agency, or other sources.

- Column B shows the most recent year-round population estimate for the entire community.
- Column C shows the percentage of the population served by the water supply system.
- Column D shows the number of out-of-town residents who are served by the water supply system.
- Column E, the annualized additional seasonal population, is calculated by multiplying the additional seasonal population by the percentage of the year that this additional population is present in the service area. For instance, if a community estimates that during the summer months of June, July and August, an extra 1,200 people use public water in the community, 1,200 is multiplied by 25% (i.e., one-fourth of the year) to obtain an annualized seasonal population of 300.
- Column F, the base service population, is calculated by multiplying column B, the current population estimate by column C, the percent of the population served by the water supplier, then adding column D, the out-of-town population, and column E, the annualized seasonal population, to this product.

Columns G through P show the water use for the base period.

- **Column G**, base system average day demand (ADD), shows the average of the average day demand, in million gallons per day, for the most recent three- to five-year period of water use. The water-use information is based on raw water pumped and water purchased, as reported on the ASR and submitted by the water supplier to MassDEP.
- **Columns H through J** show the residential portion of the base ADD.
    - Column H (residential ADD) is calculated by multiplying column G (base ADD) by column I (residential percentage of base ADD).
    - Column I, the percentage of base ADD used by the residential service population, is calculated based on the volume of metered residential use, as reported by the water

supplier in the ASRs submitted to MassDEP, divided by the volume of raw water pumped and water purchased (column G).
    - Column J, the residential water use, in gpcd, is calculated by dividing column H, residential ADD, by column F, base service population, and converting from million gallons to gallons by multiplying by one million.

- **Columns K and L** show the non-residential portion of the base ADD.
    - Column K (non-residential ADD) is calculated by multiplying column G (base ADD) by column L (non-residential percentage of base ADD) or is provided by the water supplier in its ASR submitted to MassDEP.
    - Column L, the percentage of base ADD used by the non-residential service population, is calculated based on the volume of metered non-residential use, as reported by the water supplier in the ASRs submitted to MassDEP, divided by the volume of raw water pumped and water purchased (column G).

- **Columns M and N show treatment plant processing losses.**
    - Column M is the volume of water used in municipal treatment plant system operations and is the difference between raw and finished water volumes, as reported by the water supplier in the ASRs provided to MassDEP.
    - Column N, the percentage of base ADD represented by treatment plant processing losses, is calculated by dividing the volume in Column M by the volumes of raw water and water purchased, as reported by the water supplier in the ASRs submitted to MassDEP.

- **Columns O and P** show base unaccounted-for water.
    - Column O, the average daily unaccounted-for water, is calculated by subtracting the residential and non-residential water use and treatment plant losses from the total water use in G; thus
      O = G-(H+K+M).
    - Column P, UAW as a percentage of base ADD, is obtained from information provided in MassDEP's ASRs.

Columns Q through V show how population is projected to change through the end date for the water needs forecast. Data for columns Q through T are obtained from the regional planning agency, the town, or other sources of demographic data.

- Column Q shows the population projection for the entire community.
- Column R shows the percentage of the population that will be served by the water supply system in the future. This percentage is obtained through discussions with the water supplier.
- Column S shows the future out-of-town population served.
- Column T, the future annualized additional seasonal population is the number of seasonal visitors served by a public water supplier calculated on an annual basis. The method of calculation is the same as that used for column E (annualized additional seasonal population). In certain areas with substantial seasonal populations, a more detailed assessment may be carried out by separately studying year-round and seasonal population and water use.

- Column U, the future service population, is calculated by multiplying the population projection, column Q, by the percentage of the population to be served in the future, column R, and adding the future out-of-town population, column S, and the future seasonal population factor, column T.
- Column V, the change in service population, is calculated by subtracting column F, the base service population, from column U, the future service population.

Columns W through Y show how residential water use is projected to change through the end of the forecast period.

- Column W represents the future residential water use in gpcd for the existing population.

  The water needs forecasting policy incorporates the Water Conservation Standard that water suppliers should meet, or demonstrate steady progress toward meeting, a limit on residential water use of 65 gpcd as soon as practicable, especially in those communities in a basin with a higher level of stress. For any public water supply with an existing residential water use between 66 and 80 gpcd, it is assumed that the water supplier and community will undertake all practical efforts to make steady progress toward reducing this residential water use.

  For a water needs forecast that is developed to support a WMA permit application for a system with an existing residential water use between 66 and 80 gpcd, water needs projections will be developed for five scenarios: four scenarios which show water needs if the 65 gpcd standard is achieved in 5, 10, 15, and 20 years and a fifth scenario which shows water needs if the standard is not achieved within the 20-year projection period. For a water needs forecast that is developed to support a WMA permit application for a system with an existing residential water use at or below 65 gpcd, two sets of projections will be developed: one showing future use at the current consumption rate and one showing future use at 65 gpcd.

  For water needs forecasts that are developed to guide water suppliers in their water supply planning efforts not related to WMA permitting, WRC will typically assume that the water supplier will achieve the residential water use standard of 65 gpcd within five years. Water suppliers are encouraged to discuss their specific issues with WRC staff. For water needs forecasts that are developed to support WMA permit applications, WRC will provide flexible forecasts to MassDEP so that it can determine how long a water supplier will need to achieve this standard, based on unique local conditions and the Water Management Act Permitting Policy in effect at the time the permit is being prepared.

- Column X represents the future residential water use for the new population. Water use for the new population will be projected in the same way as water use for the existing population.
- Column Y represents the future residential average daily demand (in mgd). There are two components to the calculation used to produce column Y.
    - First, the demand from the existing residential service population is calculated by multiplying the base service population (column F) by the future residential water use, in gpcd, for the existing population (column W).

- In the second component, the additional demand from new users is calculated by multiplying column V (population change) by column X (water use in gpcd for the new users).
- The two components of the calculation are added together and divided by one million to obtain the projected residential ADD in million gallons per day.

Column Z, represents the future non-residential average day demand (in mgd). It is estimated using both current employment data obtained from the Executive Office of Labor and Workforce Development and employment forecasts obtained from the Executive Office of Transportation. Future non-residential demand is calculated as follows:

1. The number of employees in the water supplier's service area for the current year is determined based on current employment data. If the service area includes less than 100% of the community, this may require discussions with local or regional planning entities to estimate the percentage of the community's employment within the service area.
2. The current ASR value for non-residential water use (column K) is divided by the current number of employees in the service area to calculate per employee water use. If the current non-residential water use is dominated by a particular sector that, in turn, causes the existing water use per employee to be unusually high or low as compared to similar water suppliers, WRC staff will consult with the water supplier and the community and may adjust the rate of future water demand per employee.
3. To accommodate for anticipated water efficiency in future non-residential water use, this per employee water use is reduced over the first ten years by 10%.
4. The resulting per employee water use is then multiplied by the employment forecasts for each of the five-year planning periods to obtain the future nonresidential water use.

Column AA represents future unaccounted-for water. To obtain the estimate of future UAW, columns Y and Z (future residential and non-residential ADD) are added together and then multiplied by a target percentage for future UAW.

The water needs forecasting policy incorporates the Water Conservation Standard that water suppliers should meet, or demonstrate steady progress toward meeting, a limit of 10% unaccounted-for water as soon as practicable, especially in those communities in a basin with a higher level of stress. For any public water supply with existing UAW between 11 and 15 percent, it is assumed that the community will undertake all practical efforts to make steady progress toward reducing UAW and achieving 10% or less as soon as practicable.

For a water needs forecast that is developed to support a WMA permit application for a system with UAW between 11 and 15 percent, water needs projections will be developed for five scenarios: four scenarios which show water needs if the 10% UAW standard is achieved in 5, 10, 15, and 20 years and a fifth scenario which shows water needs if the standard is not achieved within the 20-year projection period. For a water needs forecast that is developed to support a WMA permit application for a system with an existing UAW at or below 10%, two sets of projections will be developed: one showing future use at the current UAW and one showing future use at 10% UAW.

For water needs forecasts that are developed to guide water suppliers in their water supply planning efforts not related to WMA permitting, WRC will typically assume that the water supplier will

achieve the standard of 10% UAW within ten years. Water suppliers are encouraged to discuss their specific issues with WRC staff. For water needs forecasts that are developed to support WMA permit applications, WRC will provide flexible forecasts to MassDEP so that it can determine how long a water supplier will need to achieve this standard, based on unique local conditions and the Water Management Act Permitting Policy in effect at the time the permit is being prepared.

Column AB represents the future increase or decrease in ADD resulting from economic changes, such as a new industry moving to town. These are specific, known projects not captured in column Z (future non-residential ADD). Data for column AB are obtained from the water supplier, town planner, or regional planning agency.

Column AC is the volume of water estimated to be used in water treatment plant operations in the future. The percentage is assumed to be the same as the current percentage (column N). Future treatment plant processing losses are calculated by adding the volumes for future residential (column Y), non-residential (column Z), unaccounted-for (column AA), and significant change (column AB) and applying the percentage from column N.

Column AD, the forecasted ADD, is calculated by adding columns Y, Z, AA, AB, and AC.

REFERENCES

Executive Office of Environmental Affairs and Water Resources Commission. July 2006. Water Conservation Standards. Available at http://www.mass.gov/envir/mwrc/default.htm .

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Water Resources Commission. April 1996. Massachusetts Water Supply Policy Statement, 1996 Update. Available at http://www.mass.gov/envir/mwrc/default.htm.

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NOTE: This spreadsheet is part of the November 2, 2007, draft Policy for Developing Water Needs Forecasts for Public Water Suppliers and Methodology for Implementation

BASELINE CONDITIONS, 2005

In this example, "base" for 2005 represents data from 2003 - 2005
Seasonal population of 1,200 is annualized as follows: 1,200 x 25% (3 months) = 300
ADD = Average Day Demand; shown in million gallons per day
GPCD = gallons per capita per day
mgd = million gallons per day

	Current Population				
(A)	(B)	(C)	(D)	(E)	(F)
Community	2005 Town Pop	2005 % Serv Pop	2005 Out-of-Town Pop	2005 Annualized Add'l Seas Pop	2005 Base Service Pop
OurTown	6000	94%	30	300	5,970

Column F = (B x C) + D + E

Base Water Use									
	Residential			Nonresidential		Treatment Loss		UAW	
(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)
Base System ADD (mgd)	Res ADD (mgd)	Res % of Base ADD	Res GPCD	Non-Res ADD (mgd)	Non-Res % of Base ADD	Treatment Plant Processing Loss (mgd)	% Treatment Plant Processing Loss	UAW ADD (mgd)	UAW % of Base ADD
0.59	0.44	75%	74	0.04	7%	0.0177	3%	0.09	15%

Column H = G x I
Column J = H/F x 1,000,000
Column K = G x L
Column M = G x N
Column O = G – (H + K + M)

WATER NEEDS FORECASTS

Scenario 1: Water Conservation Standards achieved in 5 years

	POPULATION						RESIDENTIAL			NON-RES	UAW		Treatment Loss	
	(Q)	(R)	(S)	(T)	(U)	(V)	(W)	(X)	(Y)	(Z)	(AA)	(AB)	(AC)	(AD)
Year	Future Pop	Future % Service Pop	Future Out-of-Town Pop	Future Annualized Add'l Seas Pop	Future Service Pop	Pop change, Present - Future	Future Res GPCD Factor for Exist Pop	Future Res GPCD Factor for Proj Pop	Future Res ADD (mgd)	Future Non-Res ADD (mgd)	Future UAW ADD (mgd)	Future Signif. Change ADD (mgd)	Future Treatment Plant Processing Loss (mgd)	**Future Total ADD (mgd)**
2010	6150	98%	40	421	6488	518	65.00	65.00	0.42	0.0399	0.05	0.03	0.0168	0.56
2015	6300	98%	40	421	6635	147	65.00	65.00	0.43	0.0396	0.05	0.02	0.0168	0.56
2020	6458	98%	40	421	6790	155	65.00	65.00	0.44	0.0416	0.05	0.01	0.0169	0.56
2025	6615	98%	40	421	6944	154	65.00	65.00	0.45	0.0435	0.05	0.00	0.0169	0.57

Column U = (O x R) + S + T
Column V = U – F
Column Y = (F x W + V x X) / 1,000,000

Column AA = ((Y + Z) x 0.1) / 0.9
Column AC = ((Y + Z + AA + AB) x 0.03 / 0.97
Column AD = Y + Z + AA + AB + AC

Non-Residential Water Use

Community	2005 NonRes Vol (gal)	2005 NonRes ADD (mgd)	2005 Employment	2005 NonRes GPCD	2010 NonRes GPCD with 5% reduction	2015 NonRes GPCD with 10% reduction	2010 Employ-ment	2010 NonRes ADD (mgd)	2015 Employment	2015 NonRes ADD (mgd)	2020 Employment	2020 NonRes ADD (mgd)	2025 Employment	2025 NonRes ADD (mgd)
OurTown	14,600,000	0.0400	921	43.43	41.26	39.09	967	0.0399	1013	0.0396	1064	0.0416	1114	0.0435

	ADD (mgd) If Water Conservation Standards Are Achieved in				
Projection Year:	5 years	10 years	15 years	20 years	Beyond 20 years
2010	0.56	0.61	0.63	0.64	0.66
2015	0.56	0.56	0.59	0.61	0.67
2020	0.56	0.56	0.56	0.59	0.67
2025	0.57	0.57	0.57	0.57	0.68